occasionally work mischief on the skin, many of which, such as arsenic, mercury, sulphur, tar, carbolic and salicylic acids, are, when properly employed, most useful remedies. Finally, irritants belonging to the animal kingdom, such as the mosquito, gnat, bed-bug, flea, itch insect, louse, spider, and caterpillar, receive brief consideration from the author.

Thus, it will be seen that Dr. White has opened a new field in dermatology, and has collected and brought together much practical information that before only existed in the form of widely scattered papers. The work has been well done, and we take pleasure in commending the volume to all who are in any way interested in the subject.

L. A. D.

RESEARCHES UPON THE VENOM OF POISONOUS SERPENTS. By S. WEIR MITCHELL, M.D., Member of the National Academy of Sciences, U. S. A., President of the College of Physicians of Philadelphia, and EDWARD T. REICHERT, M.D., Professor of Physiology in the University of Pennsylvania. Folio pp. ix. 186. 4 Woodcuts and 5 Plates. Washington City: Published by the Smithsonian Institution, 1886.

AN admirable piece of work which has even already won for itself a portion of the recognition its merits deserve, but which will be the starting-point for any more exhaustive investigation of the same nature in the future. A plain statement of facts observed such as is found in these pages is worth volumes of conjecture without experimental evidence to back it, and for that reason the work here recorded must always be of value and can never be neglected in future research upon this important subject—more important, of course, in parts of the world infested by venomous reptiles to a greater degree than are the Middle States of North America, but necessary even there for the possible results in rescuing life from the grasp of such deadly enemies.

The fact of the rarity of venomous reptiles in the region where this investigation was conducted limited its authors in a very serious way, because a large supply of snake venom was out of the question at any one time, so that their experiments were, to a certain extent, limited in time and variety. They have themselves, however, recognized these limitations, and with the modesty of the true scientific spirit claim nothing for their conclusions which is not fully justified by the premises upon which they are based. The work is, in some sort, a continuation of what was begun by Dr. Mitchell as long ago as 1858, and the spirit in which this report is written is well expressed by the authors in the sentence: "We have foreborne to overload this paper with comments on the later researches of others, and have made the discussion of our own work as brief as was consistent with clearness."

The work is divided into eleven chapters, and begins, as is most natural with a consideration of the "Physical Characteristics of Venom," which are fluids varying in color from a very pale amber to a deep yellow. Dried with moderate rapidity they become beautiful cracked masses closely resembling a mass of crystals, which are yellow, very fragile and translucent, and retain their poisonous properties for years. Under the microscope, especially in vigorous reptiles, the venom shows a number of floating granular bodies which seem to increase in number as the vigor of the reptile decreases; besides these bodies are also found a few leucocytes and epithelial cells, and always micrococci, together with other forms of bacteria in old specimens.

The specific gravities of various species of venom are mentioned.

Following this comes the consideration of the chemical aspect of venoms and several extremely interesting facts are here revealed. Fresh venom, allowed to stand, separates into a viscid fluid and a sediment which contains the granular bodies, epithelial cells, etc., and which, after thorough washing, gives absolutely no toxic reaction when injected into animals. The toxic properties of venom are, therefore, to be looked for in the portion remaining after the removal of this "insoluble precipitate." If this residue be placed in a dialyzer after mixing with water, a whitish precipitate will be thrown down in the dialyzer in abundance if the process be continued long enough. This precipitate, thoroughly washed, gives reactions peculiar to the globulins, and the filtrate obtained in the dialyzer is shown by proper tests to contain readily dialyzable substances which belong among the peptones. The authors, therefore, show that venom contains in varying proportions for different species of reptiles, specimens of two classes of proteid bodies—the one belonging among the globulins, the other among the peptones. The venom-globulin they found to be of a complex nature and capable of being resolved into three principles, each a globulin, by processes which they have given as names to the result—*i. e.*, water-venom-globulin, copper-venom-globulin, and dialysis-venom-globulin. Each of these three substances was subjected to careful tests as to its behavior toward chemical reagents and its identity fully established. This was also done in the case of venom-peptone, and both principles were examined from the *Crotalus adamanteus*, the *Ancistrodon piscivorus*, and the *Cobra*. In the case of the first the dried venom was found to contain 24.6 per cent of globulins, of the second 7.8 per cent., and of the third 1.75 per cent., and necessarily these varying proportions of the globulins and peptones in different venoms are of great importance in explaining the varying physiological peculiarities resulting from poisoning by different species of snakes.

The authors next take up the question of the "Effects of Various Agents on Venom," and employed moist and dry heat for varying periods of time and in varying degrees of intensity upon the venoms of different serpents. Dry heat acting upon dry venom at 230° F. for thirty minutes did not destroy its activity, but moist heat at 212° F. for two minutes took away all of its active power in *Crotalus adamantheus* venom, and was even more marked in its effects upon the venom of the moccasin and cobra. A number of chemical substances were used as tests with varying results upon different venoms.

Various methods of filtration were adopted with a certain amount of success, but snake-bile, the popular remedy for a snake-bite, was tried and found to have absolutely no effect in diminishing the toxic action of the venom with which it was injected.

Their experiments show very conclusively that as a local antidote, permanganate of potash is the best for all snake poisons, and that ferric chloride is a very efficient destroyer of the venom of our own snakes, which owe their vigor to venom globulin, but has little value as a local antidote to the peptone, which gives power to the poison of the cobra, and in any case its use is indicated locally in large, full doses. Bromine may prove efficacious as well as the strong alkalies.

The effects of venom when applied to various mucus and serous surfaces was next studied, showing that it might be absorbed with varying rapidity from such situations, and then the action of venom upon the nervous system was taken up. In the latter case all the observations tended to show that the respiratory centre is the most vulnerable point of the nervous system, that the coördinating and volitional centres are those markedly affected, that the sensory part of the spinal cord and the sensory nerves are next attacked, and finally, that the motor parts of the cord and the motor nerves are the last to succumb.

A comparison of the local effects of the globulins and peptones shows a marked difference between the two—in the former case there are local bleedings, fluid blood, and capillaries giving way soon after the poison reaches them—whilst peptone venom produces swift putrefactive changes, and shows but slight capacity to make fluid the blood or to corrode the capillaries.

A long series of experiments to discover the effect of venoms and their globulins and peptones upon the pulse-rate, was made. By this it was found that of the *globulins*, the water-venom-globulin is the most potent, the copper-venom-globulin the least so, whilst the results obtained with venom-peptones agree with those obtained with pure venom, producing a primary increase and a secondary diminution of the pulse-rate—the first effect by excitation of the accelerator centres in the medulla, and that the impulses are carried through fibres passing chiefly by the spinal cord.

The action of venoms and their isolated globulins and peptones upon the arterial pressure, was the next point investigated. The injection of pure venom subcutaneously producing a progressive fall of blood pressure, whilst intravenously the fall is sudden and marked, and may be immediately followed by death; whilst the results of the experiments upon globulins and peptones seemed to justify the conclusions that the isolated principles exert the poisonous actions of pure venoms on the blood pressure, and that their toxic effects are simply different in degree.

Naturally, the next thing to investigate was the effect of these venoms and the venom-globulins and venom-peptones upon the respiration, the results of the experiments upon this point being best given in the words of the authors, that "the primary action of all the above poisons, excepting the copper-venom-globulin, is to cause an increase in the number of respirations, and, secondarily, to diminish the respirations below the normal. Of the different principles, the peptone seems to exert the most decided power in causing the acceleration, while the copper-venom-globulin seems utterly to lack this action.

The experimental evidence offered as regards the pathology of venom is not so satisfactory as the rest of the paper—especially the methods employed for the isolation and cultivation of the bacteria observed in the venoms. The whole history of the action of venoms argues against the fact that their activity is due to the propagation of bacteria in the parts affected by the poison. Nothing, however, prevents the supposition that these poisons may be the *results* of the previous growth of bacteria in the mouths or venom-sacs of the serpents themselves—a point of extreme importance, and one which these experiments have done nothing to elucidate. This is the more to be regretted because it was an opportunity not likely to occur soon again.

The effects of the various venoms upon the tissues of the body—both macroscopically and microscopically—are well pointed out, and are well explained by the facts observed in the first portion of the treatise. A summary of the conclusions reached closes the text, and a fine bibliography of the literature of the subject fitly ends one of the most creditable scientific productions of recent years. An index and several fine plates leave nothing to be desired. H. C. E.

LEÇONS SUR LES MALADIES DU SYSTÈME NERVEUX FAITES A LA SALPÊTRIÈRE. Par J. M. CHARCOT, Professeur a la Faculté de Médecine de Paris, etc. Tome troisième, 8vo. pp. 519. Paris: A Delahaye et E. Lecrosnier, 1887.

LECTURES ON DISEASES OF THE NERVOUS SYSTEM DELIVERED AT THE SALPÊTRIÈRE HOSPITAL. BY PROF. J. M. CHARCOT. Vol. III.

THE first two volumes of Charcot's lectures are so widely known, having passed through three editions and having been translated into several languages, that the third volume will be heartily welcomed by his many students and admirers. It contains twenty-six clinical lectures upon various forms of nervous disease, delivered during the past four years at his clinique. The majority have already appeared in the pages of *Le Progrès Médical*, but are well worth a second perusal.

The subjects discussed are muscular atrophy subsequent to joint disease, contractures of traumatic origin, tic convulsif, migraine ophthalmique, myelitis following sciatica, cervical pachymeningitis, aphasia, tremor, the classification of muscular atrophies, and various forms of hysteria. The last named subject has attracted so much attention in France, of late, that it is not surprising that one-half of the lectures are devoted to its study; hysteria in males, hysterical contractures, hysterical monoplegiæ, hysterical coxalgia, hysterical mutism, and the treatment of hysteria by seclusion, being fully discussed. The exact but none the less vivid description of cases, the exhaustive discussion of symptoms with interesting comments, and points of differential diagnosis, and the attractive style of the lectures, combine to make this volume as valuable an acquisition to any medical library as either of its predecessors.

It is possible in a short space, to call attention to only a few of the subjects of special interest which are treated. The classification of muscular atrophies has only recently become possible, several new forms having been described since Charcot's first volume, which contained a reference to the subject, was issued. He groups them in two categories: first, amyotrophies of spinal origin; secondly, primary progressive amyotrophies. In the first category are included (1) the atrophy of amyotrophic lateral sclerosis; and (2) the progressive muscular atrophy of the Duchenne-Aran type. In the second category are grouped (1)